UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/567,038	10/10/2006	Klaus Bergmann	DE 030431	2360

24737 7590 07/01/2009
PHILIPS INTELLECTUAL PROPERTY & STANDARDS
P.O. BOX 3001
BRIARCLIFF MANOR, NY 10510

EXAMINER	
MIDKIFF, ANASTASIA	
ART UNIT	PAPER NUMBER
2882	
MAIL DATE	DELIVERY MODE
07/01/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/567,038	BERGMANN ET AL.	
	Examiner	Art Unit	
	ANASTASIA MIDKIFF	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 February 2006 and 10 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 February 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Specification

The abstract of the disclosure is objected to because the phrase "Fig. 2" should be removed from Line 10. Correction is required. See MPEP § 608.01(b).

The disclosure is objected to because of the following informalities:

Remove the references to the claims from the specification and replace with the description of what said claims contain, examples of which are:

- In Lines 2-3 of Page 1, remove "as claimed in the preamble of Claim 1." If desired, replace with the actual preamble of claim 1;
- In Lines 30-31 of Page 2, remove "the features as claimed in independent claim 1". If desired, replace this phrase with the actual features recited by claim 1;
- In Lines 31-32 of Page 2, remove "Advantageous embodiments and further embodiments are cited in the dependent claims." If desired,

replace with --Advantageous embodiments and further embodiments are described in the following description.-- or other appropriate sentence.

Appropriate correction is required.

Claim Objections

Claims 13 and 17 are objected to because of the following informalities:

In Claim 13, Line 3 recites "the cavity" wherein there is insufficient antecedent basis for this limitation in the claim. The examiner suggests replacing "the" with --a--.

In Claim 17, Lines 2-3 recite "the evacuation" wherein there is insufficient antecedent basis for this limitation in the claim. The examiner suggests replacing "the" with --an--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3, 4, and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to Claims 3 and 4, the term "small extent" in claim 3, and the term "high thermal conductivity" in Clam 4 are relative terms which render the claims indefinite. The terms "small" and "high" are not defined by the claim, the specification

does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

With respect to claim 14, the phrase "may be" renders the claim indefinite because it is unclear whether the limitation(s) following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 10-13, and 15-19 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent to Hara et al. (US 4,749,912).

With respect to Claims 1 and 18, Hara et al. teach a gas discharge source, in particular for generating extreme ultraviolet and/or soft x-radiation, in which:

- a gas-filled intermediate electrode space (16, 17) is located between two electrodes, a cathode (13), said cathode facing away from a discharge side of the radiation (Figure 1), and an anode (14);
- devices (23, 25, 26) for the admission and evacuation of gas are present (Figure 1); and,
- one electrode, the anode (14), exhibits an opening that defines an axis of symmetry and is provided for discharge of radiation (Column 2, Lines 15-16 and Column 4, Lines 16-25);

- said source characterized in that a diaphragm (15), which exhibits at least one opening (15a) on the axis of symmetry (Figure 1) and operates as a differential pump stage, is present between the two electrodes (Column 3, Lines 18-22).

With respect to Claims 2 and 19, Hara et al. further teach that the gas pressure in the part-area of the gas-filled intermediate electrode space defined by the diaphragm and the cathode is greater than in the part-area of the gas-filled intermediate electrode space defined by the diaphragm and the electrode that faces towards the discharge side of the radiation, i.e., the anode so that the gas discharge will take place on the left branch of the Paschen curve (Column 3, Lines 18-25).

With respect to Claim 3, Hara et al. further teach that the diaphragm is designed in such a way that it contributes to the current transfer to only a small extent at the most (Column 2, Lines 27-33).

With respect to Claims 4-6, Hara et al. further teach that:

- at least a portion of said diaphragm comprises a material that is amenable to machining and/or a material with a high thermal conductivity (Column 2, Lines 27-33);
- at least a portion of said diaphragm comprises ceramics (Column 2, Lines 27-33); and,
- said diaphragm comprises a discharge-resistant material, at least in an area close to its opening (Column 2, Lines 27-33).

With respect to Claim 10, Hara et al. further teach that gas inlets (23) are present with openings facing towards the part-area of the gas-filled intermediate electrode space defined by the diaphragm and by the cathode (Figure 1).

With respect to Claim 11, Hara et al. further teach that gas inlets (26) are present with openings facing towards the part-area of the gas-filled intermediate electrode space defined by the diaphragm and by the anode (Figure 1).

With respect to Claim 12, Hara et al. further teach that the cathode is equipped with a cavity (inside 13; Figure 1), which exhibits at least one opening to the gas-filled intermediate electrode space (16, see Figure 1).

With respect to Claim 13, Hara et al. further teach that a gas inlet (25) is present with an opening to a cavity in the cathode (Figure 1).

With respect to Claims 15 and 16, Hara et al. further teach that the gas mixture in the intermediate space comprises a working gas (through 26; see Column 3, Lines 35-36) used for the gas discharge and, in addition, at least one further filler gas (through 25; see Column 3, Lines 3-7), which, by comparison with the working gas, exhibits lower radiation losses (Column 3, Lines 35-36), so that mainly the working gas is contained in the gas mixture of the electrode space (16) defined by the diaphragm and the cathode (Column 3, Lines 4-7 and 20-22) and mainly the filler gas is contained in the gas mixture of the electrode space (17) defined by the diaphragm and the anode (Column 3, Lines 32-36).

With respect to Claim 17, Hara et al. further teach that an evacuation of the intermediate electrode space takes place through the opening of the anode (Column 3, Lines 16-18).

Claims 1, 2, 4, 6, 8-10, 12-15, and 17-19 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent to Araki et al. (US 5,539,274).

With respect to Claims 1 and 18, Araki et al. teach a gas discharge source, in particular for generating extreme ultraviolet and/or soft x-radiation, in which:

- a gas-filled intermediate electrode space (2, 2a) is located between two electrodes, a cathode (25, 26), said cathode facing away from a discharge side of the radiation (Figure 1), and an anode (8);
- devices (5a, 15a) for the admission and evacuation of gas are present (Figure 1); and,
- one electrode, the anode (8), exhibits an opening that defines an axis of symmetry (BL) and is provided for discharge of radiation (Figure 1 and Column 5, Lines 41-43);
- said source characterized in that a diaphragm (7), which exhibits at least one opening on the axis of symmetry (Figure 1) and operates as a differential pump stage (Column 7, Lines 35-41), is present between the two electrodes (Figure 1).

With respect to Claims 2 and 19, Araki et al. further teach that the gas pressure in the part-area of the gas-filled intermediate electrode space defined by the diaphragm

and the cathode, is greater than in the part-area of the gas-filled intermediate electrode space defined by the diaphragm and the electrode that faces towards the discharge side of the radiation, i.e., the anode, so that the gas discharge will take place on the left branch of the Paschen curve (Column 7, Lines 35-41).

With respect to Claims 4 and 6, Araki et al. further teach that:

- at least a portion of said diaphragm comprises a material that is amenable to machining and/or a material with a high thermal conductivity (Column 12, Lines 41-46); and,
- said diaphragm comprises a discharge-resistant material, at least in an area close to its opening (Column 12, Lines 41-46).

With respect to Claims 8 and 9, Araki et al. further teaches that, in the direction of the axis of symmetry, the diaphragm extends to between 1mm and 20 mm (Column 6, Lines 10-11), and the opening of the diaphragm has a diameter of between 4mm and 20mm (Column 12, Lines 41-46).

With respect to Claim 10, Araki et al. further teach that gas inlets (5a) are present with openings facing towards the part-area of the gas-filled intermediate electrode space (16) defined by the diaphragm and by the cathode (Figure 1).

With respect to Claim 12, Araki et al. further teach that the cathode is equipped with a cavity, which exhibits at least one opening to the gas-filled intermediate electrode space (Column 5, Lines 24-27 and Figure 1).

With respect to Claims 13 and 14, Araki et al. further teach that a gas inlet (5a) is present with an opening to a cavity in the cathode (Column 5, Lines 31-35), and that a triggering device (26) is present in the cavity of the cathode (Column 5, Lines 24-27).

With respect to Claim 15, Araki et al. further teach that the gas mixture in the intermediate space comprises a working gas (Cl_2) used for the gas discharge and, in addition, at least one further filler gas (Ar), which, by comparison with the working gas, exhibits lower radiation losses (Column 8, Lines 28-31).

With respect to Claim 17, Araki et al. further teach that an evacuation of the intermediate electrode space takes place through the opening of the anode (and via 15a; see Column 5, Lines 51-53).

Claims 1-3, 7-10, 12, 13, 15, 16, 18, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent to Araki et al. (US 5,397,956).

With respect to Claims 1 and 18, Araki et al. ('956) teach a gas discharge source, in particular for generating extreme ultraviolet and/or soft x-radiation, in which:

- a gas-filled intermediate electrode space (23, 24, 25) is located between two electrodes, a cathode (5), said cathode facing away from a discharge side of the radiation (Figure 1), and an anode (47);
- devices (3, 29, and 27) for the admission and evacuation of gas are present (Figure 1); and,

- one electrode, the anode (47), exhibits an opening that defines an axis of symmetry and is provided for discharge of radiation (Figure 1, and Column 5, Lines 48-50);
- said source characterized in that a diaphragm (43, 44), which exhibits at least one opening on the axis of symmetry (Figure 1) and operates as a differential pump stage (Column 8, Lines 4-8 and Paragraph bridging Columns 10 to 11), is present between the two electrodes (Figure 1).

With respect to Claims 2 and 19, Araki et al. ('956) further teach that the gas pressure in the part-area of the gas-filled intermediate electrode space defined by the diaphragm and the cathode, is greater than in the part-area of the gas-filled intermediate electrode space defined by the diaphragm and the electrode that faces towards the discharge side of the radiation, i.e., the anode, so that the gas discharge will take place on the left branch of the Paschen curve (Paragraph bridging Columns 10 and 11).

With respect to Claim 7, Araki et al. ('956) further teach that multiple metallic diaphragms (43, 44), separated from one another by isolators (19), are present (Figure 1).

With respect to Claims 8 and 9, Araki et al. ('956) further teaches that, in the direction of the axis of symmetry, the diaphragm extends to between 1mm and 20 mm, and the opening of the diaphragm has a diameter of between 4mm and 20mm (Column 8, Lines 10-13).

With respect to Claim 10, Araki et al. ('956) further teach that gas inlets (3) are present with openings facing towards the part-area of the gas-filled intermediate electrode space defined by the diaphragm and by the cathode (Figure 1).

With respect to Claim 11, Araki et al. ('956) further teach that gas inlets (29) are present with openings facing towards the part-area of the gas-filled intermediate electrode space defined by the diaphragm and by the anode (Figure 1).

With respect to Claim 12, Araki et al. ('956) further teach that the cathode is equipped with a cavity, which exhibits at least one opening to the gas-filled intermediate electrode space (Column 5, Lines 57-61, and Figure 1).

With respect to Claim 13, Araki et al. ('956) further teach that a gas inlet (3) is present with an opening to a cavity in the cathode (Column 5, Lines 62-63).

With respect to Claims 15 and 16, Araki et al. ('956) further teach that the gas mixture in the intermediate space comprises a working gas (He; see Column 5 Line 63 through Column 6, Line 2) used for the gas discharge and, in addition, at least one further filler gas, which, by comparison with the working gas, exhibits lower radiation losses (Column 7, Lines 1-4) so that mainly the working gas is contained in the gas mixture of the electrode space (23, 24) defined by the diaphragm and the cathode (Figure 1 and Paragraph bridging Columns 10 and 11) and mainly the filler gas is contained in the gas mixture of the electrode space (25) defined by the diaphragm and the anode (Figure 1 and Paragraph bridging Columns 10 and 11).

Claims 1-7, 10, 12, 13, 15, 18, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent to Fukui et al. (US 4,894,546).

With respect to Claims 1 and 18, Fukui et al. teach a gas discharge source, in particular for generating extreme ultraviolet and/or soft x-radiation, in which:

- a gas-filled intermediate electrode space (within 30, 33a, 34a, 35a, and 39a; Figure 4) is located between two electrodes, a cathode (30), said cathode facing away from a discharge side of the radiation (Figure 4), and an anode (39);
- devices (32a, 32b) for the admission and evacuation of gas are present (Figure 4); and,
- one electrode, the anode (39), exhibits an opening (39a) that defines an axis of symmetry (Figure 4) and is provided for discharge of radiation (Column 7, Lines 13-17);
- said source characterized in that a diaphragm (31, 33, 34, 35), which exhibits at least one opening (33a, 34a, 35a) on the axis of symmetry and operates as a differential pump stage, is present between the two electrodes (Figure 1 and Column 7, Lines 13-17).

With respect to Claims 2 and 19, Fukui et al. further teach that the gas pressure in the part-area of the gas-filled intermediate electrode space defined by the diaphragm and the cathode, is greater than in the part-area of the gas-filled intermediate electrode space defined by the diaphragm and the electrode that faces towards the discharge

side of the radiation, i.e., the anode, so that the gas discharge will take place on the left branch of the Paschen curve (Column 7, Lines 13-17).

With respect to Claim 3, Fukui et al. further teach that the diaphragm (31) is designed in such a way that it contributes to the current transfer to only a small extent at the most (Column 6, Lines 30-34).

With respect to Claims 4 and 6, Fukui et al. further teach that:

- at least a portion of said diaphragm comprises a material that is amenable to machining and/or a material with a high thermal conductivity (Column 6, Lines 30-34); and,
- said diaphragm comprises a discharge-resistant material, at least in an area close to its opening (Column 6, Lines 30-34).

With respect to Claim 7, Fukui et al. ('956) further teach that multiple metallic diaphragms (33, 34, 35), separated from one another by isolators (36, 37, 38), are present (Figure 4).

With respect to Claim 10, Fukui et al. ('956) further teach that gas inlets (32a, 32b) are present with openings facing towards the part-area of the gas-filled intermediate electrode space defined by the diaphragm and by the cathode (Figure 4).

With respect to Claim 12, Fukui et al. ('956) further teach that the cathode is equipped with a cavity (within 30), which exhibits at least one opening to the gas-filled intermediate electrode space (Figure 4).

With respect to Claim 13, Fukui et al. ('956) further teach that a gas inlet (15a, 15b) is present with an opening to a cavity in the cathode (Figure 4).

With respect to Claim 15, Fukui et al. ('956) further teach that the gas mixture in the intermediate space comprises a working gas (metal vapor) used for the gas discharge and, in addition, at least one further filler gas (carrier gas, e.g. argon), which, by comparison with the working gas, exhibits lower radiation losses (Column 6, Lines 65-68).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Araki et al. ('274), as applied to Claim 1 above, and in view of U.S. Patent Application Publication to Melnychuk et al. (US 2003/0006383 A1).

With respect to Claim 1, Araki et al. ('274) teach most of the elements of the claimed invention, including a gas inlet to provide a plasma-generating discharge gas to the ionization source (Column 5, Lines 33-35) and providing an area of higher gas pressure in the region nearer the cathode (Column 7, Lines 35-41).

Araki et al. ('274) are silent with respect to the method of introduction of the filler gas to the ionization source.

Melnychuk et al. teach an EUV ionization source, wherein a filler gas, such as helium, is introduced into the region nearer a cathode, and wherein a working gas, such as xenon, is introduced in a region nearer the anode.

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide a filler gas nearer a cathode and a working gas nearer an anode, as suggested by Melnychuk et al., in the system of Araki et al. ('274), said filler gas retarding flow of debris from a region of plasma production and providing a higher pressure to the region nearer the cathode so that gas flow is promoted in a direction that provides efficient plasma production, as suggested by Melnychuk et al. (Paragraphs 76 and 77).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent Documents to: Dandl (US 3,005,931), Frohlich (US 3,315,125), Takayama et al. (US 4,841,197), Koshiishi et al. (US 5,083,061), Cirri (US 5,241,243), and Burtner et al. (US 2005/0248284 A1) teach ion generation plasma sources having multiple gas chambers between anodes with pressure differentials, anode evacuation, and/or other elements as in the present invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANASTASIA MIDKIFF whose telephone number is (571)272-5053. The examiner can normally be reached on M-F 7-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on 571-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. M./
Examiner, Art Unit 2882
06/28/09

/Edward J Glick/
Supervisory Patent Examiner, Art Unit 2882